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CW 26: Quadratics in Context + Vertical Motion

**Honors Geometry**

1. The function models the jump of a red kangaroo where is the horizontal distance in feet and *y* is the corresponding height in feet.
   1. What is the kangaroo’s maximum height?
   2. If the x value of the vertex represents half of the horizontal distance, what is the total horizontal distance the kangaroo jumped?
   3. Using your graphing calculator, sketch a graph (with correct labels) to represent the path of motion of the kangaroo.
2. During halftime of a basketball game, a slingshot launches t-shirts at the crowd. A t-shirt is launched with an initial upward velocity of 72 ft/second. The t-shirt is caught 35 ft. above the court. The function gives the t-shirts height *h*, in feet, after *t* seconds.
   1. How long will it take the t-shirt to reach its maximum height?
   2. What is the t-shirts maximum height?

**Vertical Motion Model . . .** models the height of a projectile object as a function of time. The vertical motion model is . Where *v* stands for initial vertical velocity, *s* stands for the initial height of the object and *t* stands for the time the object is in the air.

1. A frog leaps into the air from a tree branch that is 15 feet high. It has an initial vertical velocity of 20 feet per second.
2. Sketch a picture to represent the frog leaping from the tree and its path of motion.
3. Write an equation that models the height of the frog as a function of time. *Think: What information does the problem give you?*
4. What is the maximum height that the frog reaches?
5. An athlete who is 6.5 feet tall throws a shot put with an initial vertical velocity of 40 feet per second.
   1. Sketch a picture to represent the math of motion that the shot put takes.
   2. Write an equation that models the height of the shot put as a function of time.
   3. What is the maximum height that the shot put reaches?
6. Fenway Park is a Major League Baseball park in Boston, Massachusetts. The park offers seats on top of the left field wall. A person sitting in one of these seats accidentally drops his sunglasses on the field. The height *h* (in feet) of the sunglasses can be modeled by the function where *t* is the time (in seconds) since the sunglasses were dropped.
7. At what height are the sunglasses after 0.75 seconds?
8. What is the maximum height that the sunglasses will reach?
9. What is the total amount of time that the sunglasses are in the air?
10. Sketch a picture of the path that the sunglasses will take. Label it with the key information you know.